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Title: APPARATUS FOR PROCESSING FINANCIAL TRANSACTIONS ;

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Equivalents: BE1005829

ABSTRACT:

An apparatus for processing financial transactions includes a delivery unit (4) which communicates with a bank financial system (2) and with many remote client workstations (8). The apparatus (1) also includes a control unit (3). The delivery and control units each include a central message router which routes all signals to various server devices which may be processors, communication devices, or auxiliary devices. The auxiliary devices operate in the background independently of signals from the remote workstations to monitor transactions.

(12) UK Patent Application (19) GB (11) 2 282 246 (13) A

(54) Processing financial transactions.

(57) An apparatus for processing financial transactions includes a delivery unit (4) which communicates with a bank financial system (2) and with many remote client workstations (8). The apparatus (1) also includes a control unit (3). The delivery and control units each include a central message router which routes all signals to various server devices which may be processors, communication devices, or auxiliary devices. The auxiliary devices operate in the background independently of signals from the remote workstations to monitor transactions.

Fig.2

GB 2 282 246 A

Fig.1
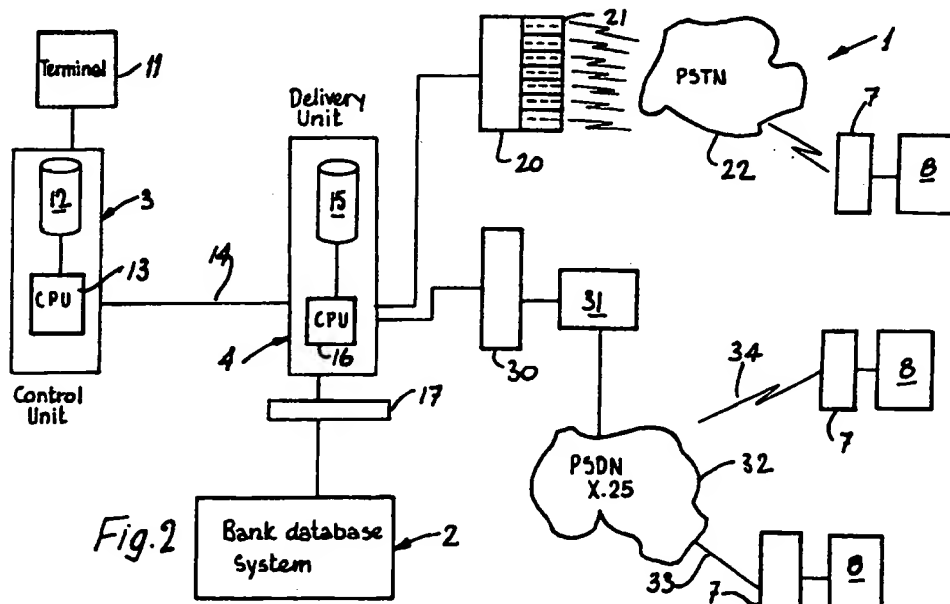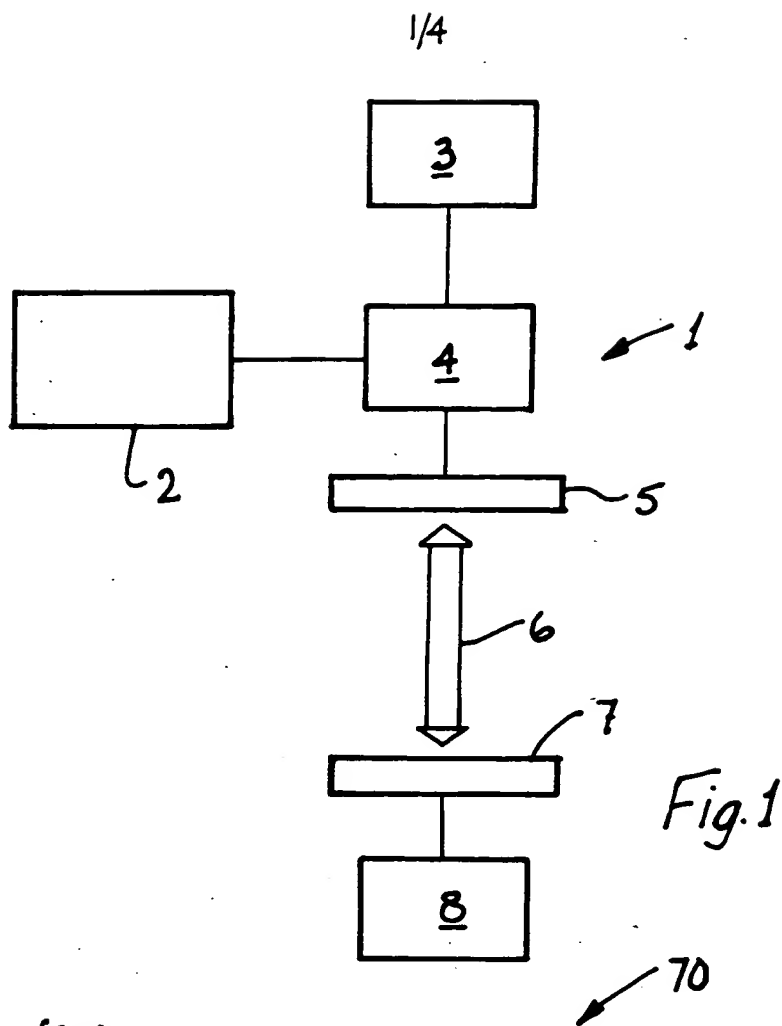
Server request / Servers activated	Accounts	MTS	Treasury	E-mail	Admin.
Accounts	✓				✓
MTS		✓			✓
Treasury	✓	✓	✓	✓	✓
E-mail	✓	✓	✓	✓	✓
Admin.	✓	✓	✓	✓	✓

Fig.5

Fig.2

Delivery Unit 16

Fig. 3

13

57

E-mail
P ↔ E-mail

55

Audit
trail
A

54

Transaction
verifier
A

52

Receive
from
delivery system
C

Central message
router

50

Payments
P ↑ Payments

S6

C.P.U. Interface

11

Transmit
to delivery
system
C

51

Fig. 4 (a)

40,50

62

db

63

Working
memory

64

Functional
circuits

61

60
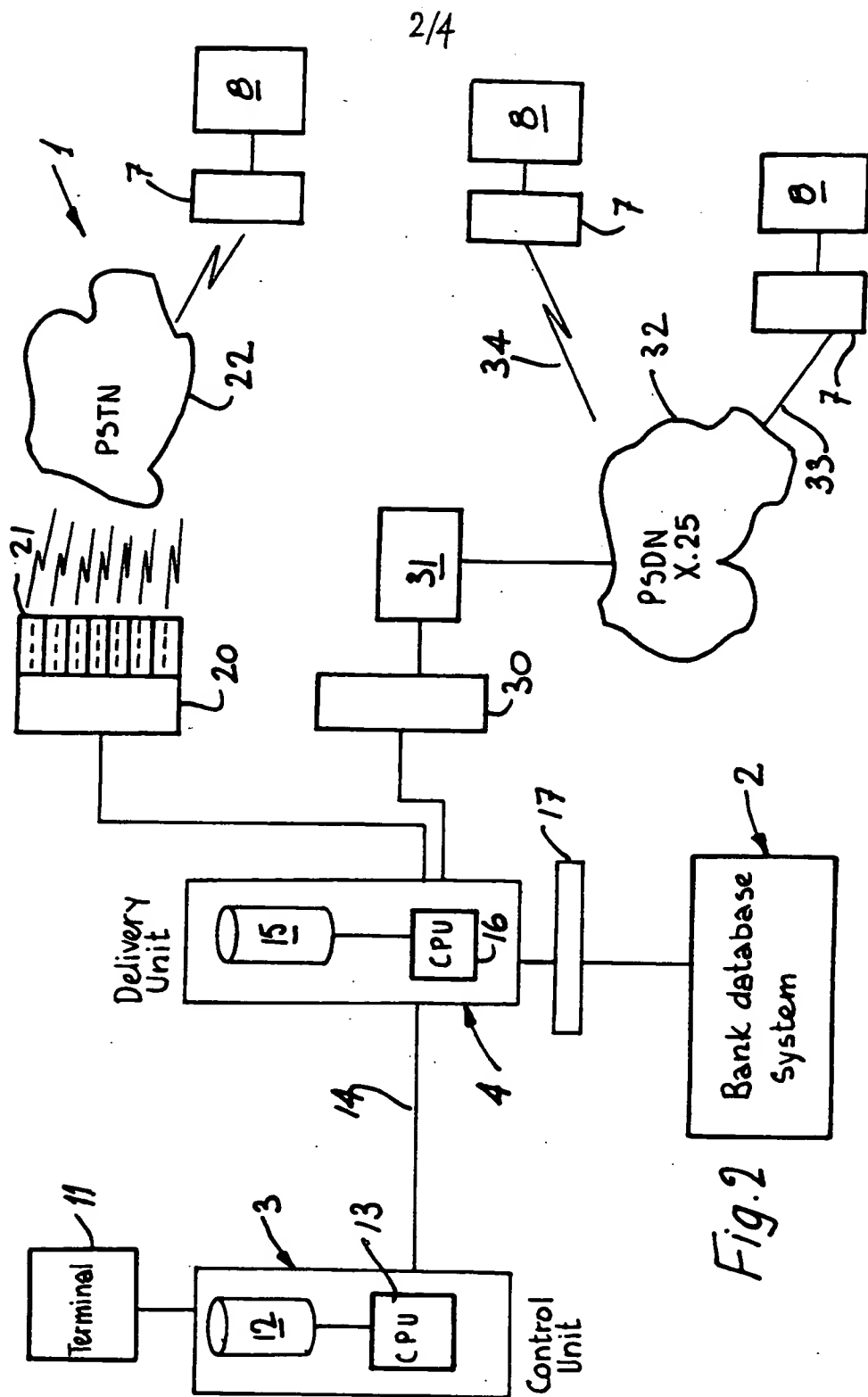
Fig. 4 (b)

"Apparatus for processing financial transactions"

The invention relates to an apparatus for processing financial transactions where the transactions are initiated by remote users. In this specification, the term "transaction" means not only what is generally
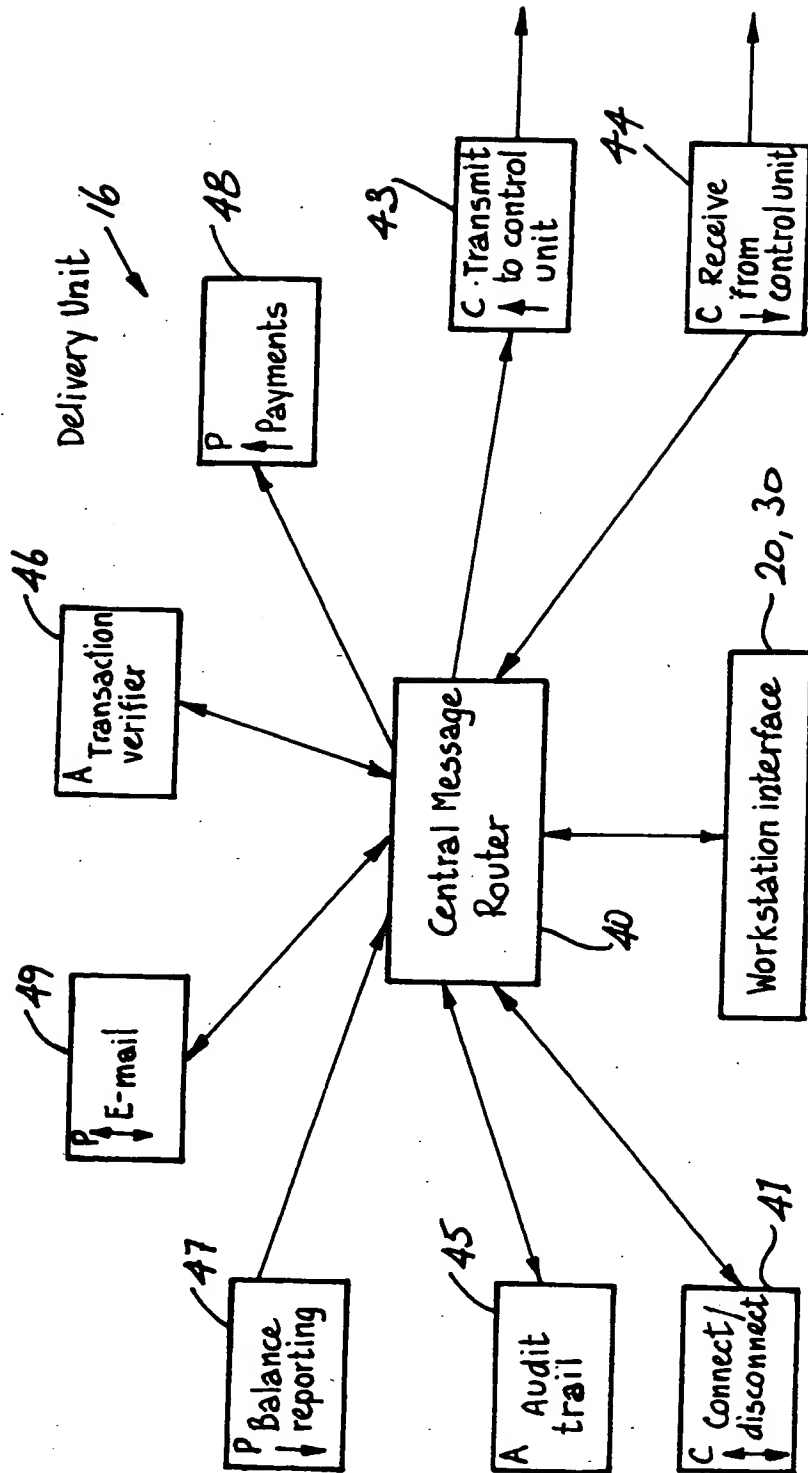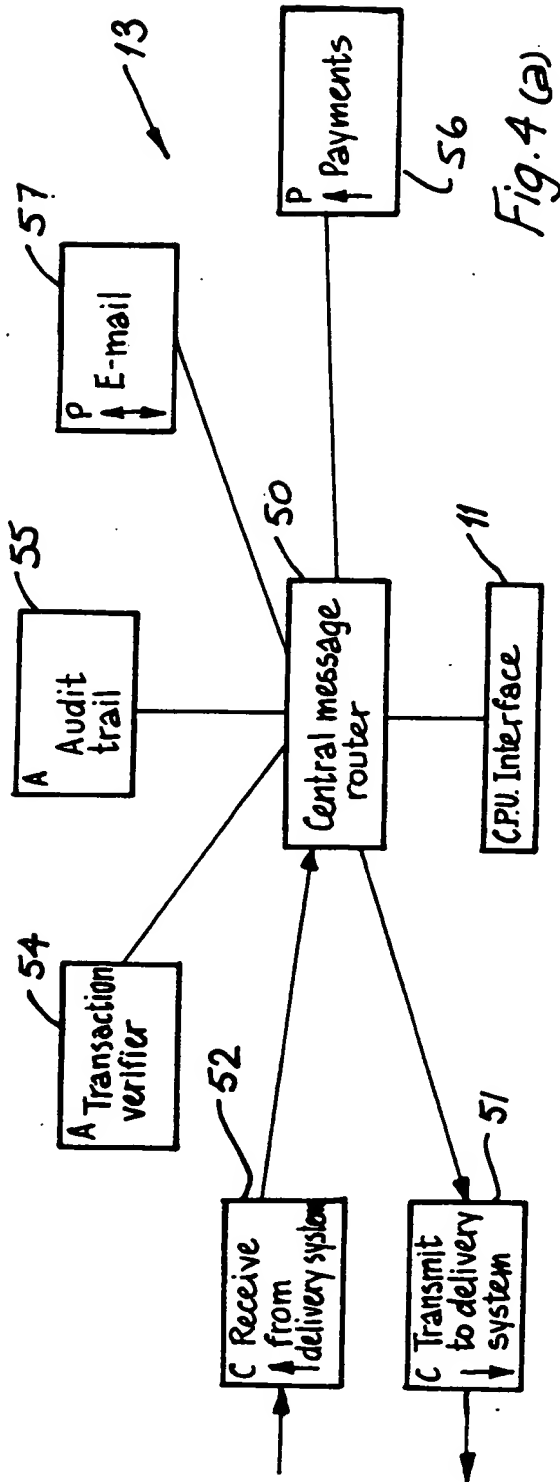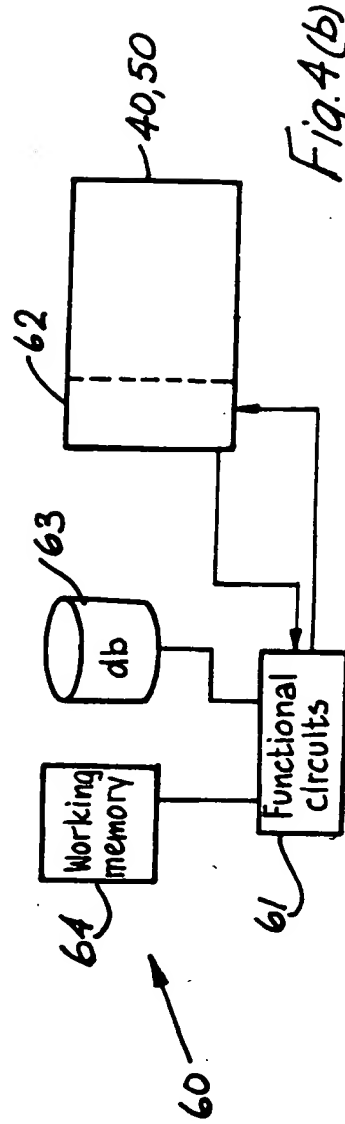
5 referred to as a transaction such as payment of a bill or lodgement of money to an account, but also the dissemination of information such as exchange rates and stock market prices.

British patent specification no. GB-B-2180380 (Merrill

10 Lynch) describes an apparatus for automated securities trading in which a central processing unit communicates with various database systems and terminals for processing transactions. European patent specification no. EP-B1-72183 (NCR Canada) describes a system for processing

15 financial transactions in which various processes are carried out for different stages such as document processing and teller verification. In addition, there are other prior art documents including EP-B1-14312 (IBM), EP-A2-527639 (US Order), WO 91/09370 (Online Resources)

20 and WO93/02422 (Checkfree Corp.) which relate to processes carried out for the implementation of financial transactions. In general, the prior art apparatus' relate primarily to the particular processes which are carried out. For example, in GB-B-2180380, the primary features

25 of the apparatus are the manner in which the central processing units process the input signals. Thus, it can be said that much work has been carried out in the area of improving the manner in which the processing takes place for the financial transactions.

30 The invention is not specifically directed to the particular processes, but to an apparatus which can carry out different financial transaction processes whereby

communication between the processors and interaction of
the processors and the various terminals is improved in
such a way as to provide a short response time, and for a
small chance of data corruption occurring.

5   Another object of the invention is to provide improved
versatility in such an apparatus so that additional
processes may be added with relatively simple interfacing
and integrated operations.

A still further object is to provide for minimisation of
10   telecommunication costs for remote users.

According to the invention there is provided a transaction
processing apparatus:-

a control unit;

a delivery unit connected to the control unit and
15   comprising an interface for connection to a
financial database system;   and

a set of remote client workstations, each
comprising an interface for remote two-way
communication with the delivery unit,

20   wherein the control unit and the delivery unit each
comprise a central message router connected to a
plurality of server devices, the server devices in each
unit comprising:-

at least two processor server devices, including:-

25   at least one upload processor constructed for
reception of data signals routed from the
associated central message router, and for

transmitting them to a destination indicated by an identifier embedded in the signals; and

5   at least one download processor constructed for retrieval of data according to a request signal routed from the associated central message router and for transmitting the data to the central message router with an embedded destination identifier of the workstation which transmitted the request signal;

10   at least one communication device constructed for transfer of data; and

at least one auxiliary device for automatic operation independently of the workstation signals, including:-

15   at least one verifier device constructed to monitor data flow in the associated central message router and for verifying the data,

wherein each server device has an associated address and comprises activation means for activation on recognition of the address;

20   wherein the control unit includes a user database of financial data updated regularly via the delivery unit, and being connected to the delivery unit central message router for said communication; and

wherein each client workstation includes addresses for 25   the upload and download processor server devices, and control means for automatically inserting a relevant address in every signal transmitted to the delivery unit.

Preferably, each client workstation includes a stored
cross-reference table of primary, user-requested
addresses, and subsidiary addresses, and the control means
comprises means for automatically inserting the related
5   subsidiary addresses with each primary address transmitted
to the delivery unit without directing display of a user
indication of this activity.

In one embodiment, a transaction verifier server device
comprises an audit trail processor arranged to
10   automatically write a transaction summary to a transaction
database by monitoring signals at the associated central
message router.

The invention will be more clearly understood from the
following description of some preferred embodiments
15   thereof, given by way of example only with reference to
the accompanying drawings in which:-

     Fig. 1 is an overview block diagram showing an
     apparatus of the invention;

     Fig. 2 is a more detailed diagram showing the
20   apparatus;

     Fig. 3 is a diagram showing the construction of a
     delivery unit of the apparatus;

     Fig. 4(a) is a block diagram showing construction of a
     control unit of the apparatus and Fig. 4(b) is a
25   diagram showing construction of a typical server
     device; and

     Fig. 5 is a table showing the manner in which a remote
     user work station of the apparatus communicates with

the delivery unit for communication of sample sets of data.

Referring to the drawings, and initially to Fig. 1, an apparatus 1 of the invention for processing financial
5 transactions is shown. The apparatus 1 is connected to a large bank database system 2. The bank database system 2 stores a very large amount of data including account details for up to approximately 3000 to 4000 customers and also a large amount of other treasury data such as stock
10 exchange information, commodity prices, deposit rates and other data. The system 2 does not form part of the invention and it is only necessary to bear in mind that it stores a large amount of data and that this data is kept up to date on a real-time basis.

15 The apparatus 1 comprises a control unit 3 which contains various control processors and storage devices. The control unit 3 is connected to a delivery unit 4, in turn connected to interface devices 5. A bi-directional, or two-way remote communications link 6 is illustrated
20 between the interfaces 5 and interfaces 7 for remote client workstations 8. The control unit 3 and the delivery unit 4 are located in a financial institution such as a bank branch physically close to the database system 2. However, it is envisaged that they may be some
25 distance apart and connected by leased lines. The client workstations 8 are at the clients' premises and may be spread over a wide geographical area.

Referring now to Fig. 2, the apparatus 1 is shown in more detail. The control unit 3 comprises a set of fixed disks
30 12 and a central processing unit (CPU) 13. The CPU 13 retrieves programs from the disks 12 and stores them in memory (not shown) so that various processes may be carried out. These processes may be initiated by the user

at a CPU terminal 11.   The disks 12 store a database of financial data which is updated regularly.

The control unit 3 is connected by a bi-directional link 14 to the delivery unit 4.   The delivery unit 4 comprises
5   fixed disks 15 connected to a CPU 16.   The CPU may retrieve different programs from the disks 15 for the carrying out of various processes.   It is envisaged, however, that either of the CPUs 13 or 16 may be replaced by a set of separate processors each dedicated to a
10   particular process.   Whether the processes are implemented primarily in software or primarily in hardware is not relevant to the invention.

The CPU 16 is connected to an interface 17 which links it with the bank database system 2.

15   The delivery unit 4 is connected to two sets of sub-components of the interface 5.   One sub-component comprises an interface 20 connected to a modem rack 21 for communication in a public service telephone network (PSTN) 22 with modems 7 for the client workstations 8.   The other
20   sub-component of the interface 5 is an interface 30 connected to an X25 routing device 31 for communication of the CPU 16 with the client workstation modems 7 via a public service data network (PSDN) 32.   As shown, the client workstation modem 7 may communicate via a leased
25   line 33, or via a dial-up connection 34.

Both the CPU 13 and the CPU 16 are constructed to carry out many different processes, the processes being primarily software driven.   As stated above, however, these processes may alternatively be implemented in
30   hardware.   An important aspect of the invention is the manner in which the various processes are interlinked. This is illustrated in Fig. 3 for the delivery unit 4, and

in Fig. 4 for the control unit 3. As shown in Fig. 3, the CPU 16 includes a central message router 40 which is connected to the interfaces 20 and 30. The central message router 40 is connected to a number of processes,

5   each being referred to as a server device. The server devices fall into three main categories as follows:-

A.   a processor for handling of data and/or request or instruction signals;

B.   a transfer or communication device, whose only

10   function is the routing of information; and

C.   an auxiliary device for the carrying out of off-line processes not directly related to transaction processing.

In the diagram, processors are indicated by the letter P,

15   communication devices by the letter C, and auxiliary devices by the letter A. In addition, upwardly-directed arrows indicate data flow into the delivery unit 4 (upload processor) whereas downwardly-directed arrows indicate data flow out of the delivery unit 4 (download processor).

20   The CPU 16 of the delivery unit 4 has connect/disconnect transmit and receive server devices 41, 43 and 44, respectively. The auxiliary devices include an audit trail device 45 and a transaction verifier 46. The processor devices include a balance reporting device 47,

25   a payments device 48 and an electronic mail device 49.

Referring specifically to Fig. 4(a), the central message router 50 is connected to transmit and receive communication devices 51 and 52, respectively. The devices 51 and 52 in the CPU 13 communicate with the

30   devices 43 and 44 in the CPU 16. The central message

router 50 is also connected to transaction verifier and audit trail auxiliary devices 54 and 55. The processor devices include a payments device 56 and an electronic mail device 57.

5   Referring specifically to Fig. 4b, construction of a typical server device indicated generally by the reference numeral 60 is illustrated. The server device 60 comprises a set of functional circuits 61 connected to a database 63 and to a working memory 64. The functional circuits 61

10   are also connected to a buffer memory 62 in the router 40 or 50. The buffer memory 62 is used for the passing of data or instruction signals between the server devices.

In operation, as stated previously, the bank database system 2 is kept up to date in real-time with financial

15   information. The delivery unit 4 communicates with the system 2 and updates a large database on the fixed disk drives 15. This database stores selected data for clients to minimise the amount of traffic required between the interface 17 and the system 2. There is also a large

20   amount of data stored on the database on the fixed disk drives 12 of the control unit 3. However, in addition there are many software programs stored on the disks 12 which govern operation of the apparatus 1 and control such things as security for accessing bank client workstations.

25   In this respect, it is advantageous that the client workstations do not directly access the control unit 3 as the opportunity for "hacking" is minimised.

Each client workstation 8 may transmit a signal via the relevant communication circuits to the central message

30   router 40 of the delivery unit 4. These signals include embedded addresses for the relevant server devices. The central message router 40 recognises these addresses and re-transmits the signals to the relevant server devices.

However, the client work stations 8 do not store addresses for the auxiliary or the communications server devices - only the processor devices. The auxiliary devices are generally not addressed by the central message router, while the router does use the communication devices 41, 43 and 44 for communication with the router 50 and the interfaces 20 and 30.

The client workstation 8 (which is a microcomputer) is programmed to automatically insert the relevant server device address in the signal which is transmitted to the router 40. Such a signal may be a request for information regarding a bank balance, in which case the device 47 is addressed. If electronic mail is required, the device 49 is addressed, whereas if the user wishes to make a transaction such as payment to an account, the device 48 is used. As is clear from the drawings, for some processes there are server devices in both the control unit 3 and the delivery unit 4. In this way, the processing work is distributed between the two units and one processor may be assigned to one group of clients, whereas the other may be assigned to a different group. The server devices are programmed to recognise their addresses and automatically become activated.

An important aspect of the invention is that the client workstations are constructed to automatically insert the address for the relevant server device when transmitting a signal as a primary address. However, in addition, each client workstation refers to a cross reference table such as that indicated by the numeral 70 in Fig. 5. According to the table 70, the client workstation 8 when inserting the address for the relevant server device will also insert subsidiary addresses for other server devices in default mode "transparently" to the client. Thus, if the client wishes to access a server device for accounts, the

client workstation automatically inserts a primary
address, namely that for an accounts server device, and
also subsidiary addresses for MTS (monetary transaction
services), treasury, electronic mail and administration
5   server devices. As will be apparent, the server devices
as illustrated in the table 70 are not the same as those
shown in the previous drawings. The nature of the
processes carried out by the server devices are not
important. For example, a client workstation may cause
10   the downloading of balance statements for a client, which
is what the client requested. However, in addition, the
client workstation also receives electronic mail and
treasury data and also various administration data
unbeknownst to the client. This data is stored on disk in
15   the client workstation and may be retrieved at any time.
This provides for a very fast response time to the client
as it is not necessary to make a remote connection. It
will thus be appreciated that when each communication
session is established, a large amount of data is
20   downloaded, and this minimises the number of connections
which are required. By minimising the number of
connections which are made, and minimising the amount of
traffic, the chances of data corruption occurring are
minimised, and relatively small telecommunication charges
25   will arise for the clients.

While the processor and communication server devices are
operating according to instructions from the client
workstations and the router 40, the auxiliary server
devices operate in the background in automatic mode
30   without reference to any other device. The audit trail
device 45 monitors all transactions which pass through the
relevant central message router and logs them to a
database. At periodic intervals this data is archived to
tapes. Accordingly, a comprehensive audit trail is
35   provided for all of the transactions which are processed

by the apparatus 1. In addition, the transaction verifier
46 acts as a "watchdog" to monitor transactions to ensure
that data transmitted from clients and to clients does not
exceed tolerance values and it also monitors accesses to
5   data to check for security reasons.

An important aspect of the invention is the manner in
which all signals, both data and instructions, are
transmitted through a central message router in each of
the two units. This allows audit trail and transaction
10   verification operations to be carried out in a simple
manner whereby all data may be monitored quite easily. It
also allows maximum versatility in the manner in which
various devices may be interconnected. This is very
important from the commercial perspective as it allows
15   additional processes to be easily added in a modular
"bolt-on" fashion. Additionally client workstations may
receive a large amount of data for each communication
session. Important aspects of the invention are the
manner in which the various devices are interconnected,
20   and not the actual processes which are carried out.

The invention is not limited to the embodiments
hereinbefore described. But may be varied in construction
and detail.

CLAIMS

1. A transaction processing apparatus comprising:-

a control unit;

5   a delivery unit connected to the control unit and
comprising an interface for connection to a
financial database system; and

a set of remote client workstations, each
comprising an interface for remote two-way
communication with the delivery unit,

10   wherein the control unit and the delivery unit each
comprise a central message router connected to a
plurality of server devices, the server devices in each
unit comprising:-

at least two processor server devices, including:-

15   at least one upload processor constructed for
reception of data signals routed from the
associated central message router, and for
transmitting them to a destination indicated by an
identifier embedded in the signals; and

20   at least one download processor constructed for
retrieval of data according to a request signal
routed from the associated central message router
and for transmitting the data to the central
message router with an embedded destination
25   identifier of the workstation which transmitted
the request signal;

at least one communication device constructed for transfer of data; and

at least one auxiliary device for automatic operation independently of the workstation signals, including:-

5   at least one verifier device constructed to monitor data flow in the associated central message router and for verifying the data,

wherein each server device has an associated address and comprises activation means for activation on
10   recognition of the address;

wherein the control unit includes a user database of financial data updated regularly via the delivery unit, and being connected to the delivery unit central message router for said communication; and

15   wherein each client workstation includes addresses for the upload and download processor server devices, and control means for automatically inserting a relevant address in every signal transmitted to the delivery unit.

20   2. An apparatus as claimed in claim 1, wherein each client workstation includes a stored cross-reference table of primary, user-requested addresses, and subsidiary addresses, and the control means comprises means for automatically inserting the related subsidiary
25   addresses with each primary address transmitted to the delivery unit without directing display of a user indication of this activity.

3. An apparatus as claimed in claims 1 or 2, wherein a transaction verifier server device comprises an audit

trail processor arranged to automatically write a transaction summary to a transaction database by monitoring signals at the associated central message router.

5   4. An apparatus substantially as hereinbefore described, with reference to, and as illustrated in, the accompanying drawings.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 _-15-_ (The Search report)	Application number GB 9319797.8

Relevant Technical Fields	Search Examiner S J PROBERT
(i) UK Cl (Ed.L) G4A (AMP, AUXF)	
(ii) Int Cl (Ed.5) G06F 15/30, 15/16	Date of completion of Search 3 NOVEMBER 1993
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE DATABASE: WPI	Documents considered relevant following a search in respect of Claims :- 1-4

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A	GB 2251098 A ("ALLIED IRISH BANKS")	1-4

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